



Natural Gas Vehicles for America

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The Honorable Paul Tonko
Chairman
Energy and Commerce Subcommittee on
Environment and Climate Change

The Honorable John Shimkus
Ranking Member
Energy and Commerce Subcommittee on
Environment and Climate Change

Dear Chairman Tonko and Ranking Member Shimkus,

NGVAmerica contacts you today to provide comments related to the October 23rd Environment and Climate Change Subcommittee hearing on "Building a 100 % Clean Economy: Solutions for Planes, Trains and Everything Beyond Automobiles". NGVAmerica is a national trade association dedicated to creating a profitable, sustainable and growing market for compressed natural gas (CNG)- and liquefied natural gas (LNG)-powered vehicles. NGVAmerica represents more than 200 companies, including vehicle manufacturers; natural gas vehicle component manufacturers; natural gas distribution, transmission, and production companies; natural gas development organizations; non-profit advocacy organizations; state and local government agencies; and fleet operators. NGVAmerica and our member companies represent all parts of the natural gas vehicle industry, including light-duty vehicles, trucks, buses, trains, marine vessels, and transport services.

NGVAmerica and our member companies view natural gas in transportation as key to building a 100% clean economy. Increased use of natural gas in transportation reduces greenhouse gas emissions (GHGs) while reducing other negative impacts of traditional transportation fuels, including particle pollutants, SO_x and NO_x. Despite the tremendous environmental successes of natural gas in transportation, deployment of NGVs in the United States falls far behind other countries around the world. With the help of federal policymakers, it is possible to support a growing market for clean, abundant, domestic, affordable natural gas and renewable natural gas in our transportation market. As such, we would ask the Committee to include natural gas vehicles in any policy intended to create a 100% clean economy.

There are two main reasons to support increased natural gas in transportation as part of our clean transportation future:

- Renewable natural gas (RNG) offers the most drastic, immediate carbon reductions of any transportation fuel;
- Natural gas offers fuel solutions for a variety of high fuel-use vehicle types required of a clean economy, including heavy-duty trucks, buses, locomotives, marine vessels, construction and specialty equipment.

Advocating the increasing use of NGVs where they benefit most.
For the economy. For the environment. For health. For security. **For America.**

Natural Gas & Renewable Natural Gas: Carbon Reductions in Transportation

As Chairman Pallone stated in the hearing announcement: “The transportation sector is the largest source of greenhouse gas (GHG) emissions in the United States, accounting for 29% of total emissions.”¹ The hearing announcement also included a claim the natural gas industry disputes, stating “Liquified or compressed natural gas may also play a role in fuel-switching. However, the climate benefits of switching to natural gas are significantly lower in heavy-duty transportation than in other industries, such as from coal to natural gas for electricity generation.” With advanced engine technology, and most importantly, the tremendous growth in deployment of vehicles powered by renewable natural gas, the climate benefits of switching to natural gas-powered vehicles are evident, and these benefits can be realized today.

The number one source of urban emissions are vehicles such as short-haul, long-haul, refuse, school and transit buses. 74% of heavy-duty trucks are not certified to latest NOx emissions standards. These high polluting trucks are diesel trucks, but newer technology offers affordable, clean options offering a big impact when it comes to clean air. In fact, replacing 1 traditional diesel-burning heavy-duty truck with 1 new Ultra Low-NOx natural gas heavy-duty truck is the emissions equivalent of removing 119 traditional combustion engine cars off our roads. Utilize renewable natural gas in this Ultra Low-NOx engine and the emissions reductions are even more dramatic.

Renewable natural gas (RNG) is a domestic, renewable, clean fuel derived from organic waste resources (agriculture, landfills, waste water treatment plants, and municipal solid waste). Some of these sources result in a fuel that can have a negative carbon intensity. In other words, using RNG as a transportation fuel is actually removing GHGs that would otherwise be emitted to the atmosphere. RNG use in the NGV industry continues to grow. A fleet or individual who makes the transition to operating vehicles on natural gas is reducing the amount of carbon dioxide that could exist in the atmosphere for millennia.

Using natural gas in transportation provides an immediate reduction in long-lived carbon dioxide emissions. Carbon dioxide (CO₂) is the primary long lived pollutant, and while much of the CO₂ can be absorbed by the oceans within centuries, the remaining CO₂ can stay in the atmosphere for thousands of years.² The US EPA states that, “Atmospheric CO₂ is part of the global carbon cycle, and therefore its fate is a complex function of geochemical and biological processes. Some of the excess carbon dioxide will be absorbed quickly (e.g., by the ocean surface), but some will remain in the atmosphere for thousands of years, due in part to the very slow process by which carbon is transferred to ocean sediments.”³

¹ U.S. Environmental Protection Agency, Sources of Greenhouse Gas Emissions (epa.gov/ghgemissions/sources-greenhouse-gas-emissions) (Sept. 13, 2019).

² Archer, D., Eby, M., Brovkin, V., Ridgwell, A., Cao, L., Mikolajewicz, U., . . . Tokos, K. (2009). Atmospheric lifetime of fossil fuel carbon dioxide. *Annual Review of Earth and Planetary Sciences*, 37, 117-134.

doi:10.1146/annurev.earth.031208.100206 (http://climatemodels.uchicago.edu/geocarb/archer.2009.ann_rev_tail.pdf)
³ Overview of greenhouse gases. Retrieved from <https://www.epa.gov/ghgemissions/overview-greenhouse-gases#CO2%20lifetime>

Methane on the other hand is a short-lived climate pollutant (SLCP), which during its brief lifetime has a greater potential to capture heat, but remains in the atmosphere for a much shorter amount of time. This is a crucial distinction policymakers must bear in mind when considering the future of transportation policy; the focus should be on reducing carbon dioxide, which can stay in the atmosphere for thousands of years. The NGV industry is demonstrating its ability to dramatically reduce the amount of methane emitted along the whole supply chain, minimizing the short-term impact of methane and leading to a stronger contribution to overall climate change mitigation than many other currently available fuels used in the transportation sector.

Natural gas vehicles are key to reducing these dangerous emissions as we battle against climate change, and deploying cleaner technology can reduce this significant source of GHGs. The newest heavy-duty natural gas trucks are 90% cleaner than the EPA's current NOx standard and 90% cleaner than the latest available diesel engine.⁴ Fueling with natural gas reduces CO2 and greenhouse gas emissions compared to comparable diesel. If fueling with LNG, the well-to-wheels GHG emissions reduction is 11%; fueling with CNG is a 17% reduction.⁵ However, fueling with renewable natural gas (RNG) provides even greater CO2 and greenhouse gas emission reductions, anywhere from 40-125% on a well-to-wheels basis depending on food stock.⁶ When it comes to carbon intensity, the California Air Resources Board's Low Carbon Fuel Standards Pathways certified carbon intensity values for RNG (Bio-LNG or Bio-CNG) as the lowest Energy Economy Ratio-Adjusted Carbon Intensity, as low as -400 CI.⁷

Utilized in heavy-duty NGVs and incentivized through the Renewable Fuels Standard, Low Carbon Fuel Standards, and the Alternative Fuels Tax Credit, RNG use as a transportation fuel has increased 577%, displacing 7+ million tons of carbon dioxide equivalent (CO2e).⁸ In 2018 alone, 32%, of all on-road fuel used in natural gas vehicles was RNG, which is over 200 million gasoline gallon equivalents. Over the past five years, RNG as a Transportation Fuel lowered greenhouse gas emissions equivalent to removing 1,539,565 gasoline passenger cars from our roads for one year, reduced CO2 emissions equivalent to 815,950,377 gallons of gasoline or 712,313,458 gallons of diesel consumed, which is equal to the total energy used by 868,321 U.S. homes for one year.⁹

Fleets are using RNG at rapidly increasing volumes. For example, UPS's alternative fuel and advanced technology vehicles now exceed 10,000 vehicles globally. Using renewable fuels, UPS trucks are achieving up to a 90% reduction in lifecycle greenhouse gas emissions when compared to conventional diesel trucks.

Since 2014, UPS has used 28 million gallons equivalent of renewable natural gas (RNG) in its CNG or LNG powered trucks. In May 2019, UPS announced the largest U.S. purchase of

⁴ <https://www.ngvamerica.org/wp-content/uploads/2018/12/NGV-VW-HD-Trucks.pdf>

⁵ Source: NGVAmerica Emissions Whitepaper based on CARB LCFS **Numbers compared to diesel emissions (well-to-wheel)*

⁶ Source: www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm, CARB, February 2017. Adjusted for heavy-duty truck applications.

⁷ <https://www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm>

⁸ <https://www.ngvamerica.org/wp-content/uploads/2019/04/RNG-Driving-Down-Emissions.pdf>

⁹ <https://www.ngvamerica.org/wp-content/uploads/2019/04/RNG-Driving-Down-Emissions.pdf>

renewable natural gas in history, a seven-year agreement to purchase 170 million gallons-equivalent of RNG through 2026 with annual purchases of 22.5 million to 25 million gallons equivalent. This will reduce UPS GHG emissions by more than 1 million metric tons. In October 2019, UPS announced plans to invest \$450 million during 2020 to 2022 to buy 6,000 natural gas powered trucks, all capable of operating on renewable natural gas. Continued federal policy support for RNG will encourage other fleets to decarbonize through this abundant, affordable fuel.

Unfortunately, cost of RNG production remains high. California, through a diesel tax and Low Carbon Fuel Standard, has created a viable market for RNG use in transportation. For the rest of the country to follow suit and reap related economic and environmental benefits, the cost of utilizing RNG needs to be reduced and further deployment is needed. Before accounting for RNG use, and with remaining incremental costs on NGVs, they still remain the most cost-effective mechanism of NOx reduction across several vehicle applications. On a heavy-duty truck, the life-cycle NOx emissions are greater than both diesel and electric trucks, and when comparing the cost of NOx reduction, natural gas heavy-duty trucks are 53% more cost effective than diesel alternatives and 47% more cost effective than electric options. Similarly, when comparing the cost of NOx reduction for refuse trucks, natural gas refuse trucks are 86% more cost-effective than diesel alternatives and 54% more cost effective than electric options.¹⁰

Natural Gas: A Solution Across Vehicle Types

While heavy-duty trucks are a significant contributor of transportation-related emissions, if the goal of the Committee is to move to a 100% clean economy, there are other vehicle types that will need to be made cleaner. For most of these vehicles, there are natural gas options on-road today, providing measurable and significant emissions improvements.

School and Transit Buses

Every day, 25 million children in the U.S. spend an average of an hour and a half on public school buses. School districts and health advocates have recognized the importance of reducing students' exposure to harmful diesel exhaust emissions, but this also represents an opportunity to reduce harmful climate pollutants from these vehicles.

There are now more than 150 school districts operating approximately 5,500 natural gas-powered school buses. Replacing older diesel buses with new cleaner natural gas buses to achieves the greatest amount of emissions reduction and air quality benefit per dollar spent. When comparing the cost of NOx reduction, natural gas buses are 95% more cost effective than diesel alternatives and more than 50% more cost effective than the limited availability of electric options.¹¹

Transit agencies, particularly transit agencies in non-attainment zones or in areas where weather conditions do not permit effective deployment of electric buses, have increasingly

¹⁰ Emission comparisons are based on results using Argonne National Laboratory's HDVEC tool (<https://afleet-web.ex.anl.gov/hdv-emissions-calculator/>) and include modeling of new low-NOx natural gas engines and the diesel in-use emission option.

¹¹ <https://www.ngvamerica.org/wp-content/uploads/2018/12/NGV-VW-School-Buses.pdf>

invested in clean, natural-gas powered transit buses. Road tested and ready to deploy, there are over 12,000 natural gas transit buses on U.S. roads today. In one example, a transit fleet began converting its entire bus fleet to natural gas in 2017. With over 310 CNG buses today, they plan to add 240 more by 2020. These buses average a 600-mile range on a single fill. Upon entire fleet conversion, this transit agency should realize annual fuel savings of \$8.5 million and reduce its NOx emissions by 97%.

The Los Angeles County Metropolitan Transit Authority (LA Metro) operates the largest natural gas transit fleet in North America with more than 2,250 CNG buses. In the fall of 2016, LA Metro began deploying and testing near-zero-emission natural gas engines. In May 2017, LA Metro signed a multi-year contract with Clean Energy to purchase renewable natural gas (RNG), with plans to run on 100% RNG within five years.¹² When comparing the cost of NOx reduction, natural gas transit buses are 96% more cost effective than diesel alternatives and 36% more cost effective than limited and cost-prohibitive electric options. The availability of natural gas-powered buses has enabled transit agencies to modernize their fleets while maintaining consistent passenger prices due to the affordability of natural gas.

Off-Road Vehicle Applications: Rail, Marine, and Specialty Equipment

Another benefit to natural gas and to RNG in transportation is the opportunity to begin displacing diesel fuel and marine oil in high fuel-use, off-road applications. Use of natural gas in rail applications is increasing in popularity due to a wide array of benefits. The top 7 Class 1 railroads (line-haul freight) consume over 3.6 billion gallons of diesel fuel per year, which translates to 10 million gallons per day, representing 7% of all diesel consumed in the U.S. LNG-powered locomotives offer 900 miles of heavy-haul service range¹³ and a 60 mph heavy-haul speed capability while also providing 50% fueling cost savings over diesel¹⁴.

It is estimated that an LNG locomotive costs \$1 million more than its diesel counterpart. Because trains are kept in service for relatively long periods of time and consume huge amounts of fuel, they represent an application ripe for transitioning to natural gas. Further, once incremental costs of implementation has been paid back, the price spread between the fuels allows for tremendous long-term savings in utilizing LNG over diesel. These savings can seriously impact the bottom line of rail operators because the industry's fuel costs represent an average of 23% of its total operating expenses. While there are pilot tests for LNG locomotive technology, further research, development, and deployment of CNG and LNG locomotives will aid in energy security and clean air goals for decades to come, offering a significant reduction in consumption of diesel. There is a significant role for federal investment in incentives and related research and development for LNG use in rail applications.

¹² <https://www.ngvamerica.org/wp-content/uploads/2018/12/NGV-VW-Transit-Buses.pdf>

¹³ <http://www.chartindustries.com/Energy/LNG-Solutions-Equipment/End-Use-Applications/Rail-Fueling>

¹⁴ <http://files.chartindustries.com/FEC-LNG-FloridaEastCoastRailwayCaseStudy.pdf>

In marine applications, LNG offers another clean alternative for high fuel-use vessels. For LNG-powered cargo freighters, there are 30% fewer CO₂ emissions¹⁵ and 0 equivalent NO_x/SO_x emissions¹⁶. It is estimated that 32% of total shipping energy use by 2050 will be LNG¹⁷. In specialized construction and mining equipment, LNG offers 17% reduction in CO₂ and GHG emissions, 50% fueling cost savings over diesel, 120+ octane equivalent.¹⁸

Conclusion

The need for clean air is clear, and we are in a crucial time for reducing greenhouse gas emissions and carbon intensity due to increased concerns over climate change. As a clean, domestic fuel option, natural gas is an American solution, delivering the largest and most cost-effective reductions in transportation-related pollutants than any other powertrain option commercially-available today. And when fueled by renewable natural gas captured from agricultural, food, landfill, or wastewater waste, even greater CO₂ and greenhouse gas emission reductions are achieved, with the fuel burning carbon neutral or even carbon negative.

Natural gas delivers more new vehicles and far greater emission benefits for the investment than any other alternative. No other transportation fuel is as sustainable, adaptive, and competitive across all vehicle classes. Natural gas currently powers passenger vehicles, medium-duty work vehicles, short- and long-haul trucks, school buses, transit buses and shuttles, refuse trucks, construction and mining equipment, marine vessels, and locomotives. Yet despite the overwhelming evidence that NGVs make an excellent alternative fuel choice, there remain less than 175,000 NGVs on U.S. roads today. Compared to over 26 million natural gas vehicles on roads worldwide, there remains an untapped opportunity for improved environmental and economic results from alternative fuel vehicles such as NGVs.

There remains a substantial role for the federal government in promoting further deployment of NGVs and RNG. Reinstatement of the \$0.50/gallon Alternative Fuels Tax Credit (AFTC) and support for policies encouraging development of RNG and RNG-powered vehicles are but two ways Congress can help clean up non light-duty vehicles through policy in support of solutions that are on-road, commercially available today.

Thank you for the opportunity to provide input as the Subcommittee considers the future of clean transportation.

For additional information concerning this statement, please contact:

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¹⁵ <https://www.marineinsight.com/tech/10-noteworthy-lng-fueled-vessels/>

¹⁶ https://www.enidaily.com/en/technology_en/lng-fuel-shipping-sector/

¹⁷ <http://www.seatrade-maritime.com/news/asia/conditions-right-for-lng-to-set-sail.html>

¹⁸ NGVAmerica Emissions Whitepaper based on CARB LCFS; *Numbers compared to diesel emissions (well-to-wheel)